UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL RISK MANAGEMENT RESEARCH LABORATORY
GROUND WATER AND ECOSYSTEMS RESTORATION DIVISION
P.O. Box 1198 Ada,OK 74820

OFFICE OF
RESEARCH AND DEVELOPMENT

September 16, 2011

MEMORANDUM

SUBJECT: Technical Review of Groundwater Contamination at the Omega Chemical Corporation Superfund Site, Whittier, CA (11-R09-006)

FROM: David S. Burden, Ph.D., Director
Ground Water Technical Support Center

TO: Lynda Deshambault, RPM
U.S. EPA Region 9

In response to your request, EPA's Ground Water Technical Support Center has completed a technical review of documents regarding the groundwater contamination at Operable Unit 2 (OU2) of the Omega Chemical Corporation Superfund Site (Omega Site) located in Whittier, California. The review was conducted under my direction, by Dr. Milovan Beljin, subcontractor to Shaw Environmental, a contractor to EPA's Ground Water and Ecosystems Restoration Division. The professional opinions in the memo are based on a preliminary review of technical documents, a site visit, and an interview of the CH2M HILL groundwater modelers in June of 2011 by Dr. Beljin. I have reviewed the comments below and concur with them. If you have any questions, please contact me at your convenience.

The contaminants at the Omega Site have been introduced to the groundwater as a result of the release of hazardous substances at the former Omega facility. The contaminant plumes emanating from the Omega facility moved with the regional groundwater flow and have commingled with contaminants released from other source areas. The length of the contaminant plumes is up to 4.5 miles to the southwest from the Omega Site property. A detailed discussion of the groundwater contamination at OU2 is presented in the RI/FS reports (CH2M HILL, 2010).

One of the issues raised is whether a single contaminant source could generate a 4.5 mile-long plume. However, in California and other states, similarly large (and larger) plumes of the same contaminants (TCE, PCE) have been investigated and documented. In addition to the length of time since the first contaminant spill occurred, the length of a plume is a function of the type of chemicals, the contaminant source, the local (hydro)geology, and the recharge and discharge centers that can affect the groundwater flow regime. None of the existing conditions at the

Omega Site preclude development of a 4.5 mile plume. The contamination from the former Omega facility has advanced at an apparent plume expansion rate of 540 feet per year (ft/year). This plume expansion rate is consistent with estimates of advective velocity of 620 ft/year simulated by analytical transport model. The input parameters of the analytical model presented to the reviewer appear to be reasonable and within the expected range.

The operations at the Omega Site began 35 years ago in 1976. In evaluating the groundwater plume development, there is a concern that the transport time through the unsaturated zone, from the surface to the groundwater table, has been ignored. The rate of infiltration of Dense Nonaqueous Phase Liquids (DNAPLs), such as TCE and PCE, may be extremely rapid due to their low viscosity and the high specific gravity. The actual penetration time is extremely difficult to predict because it depends on many variables, including the volume of a spill, the number of spills, the subsurface soil type, the heterogeneity of the soil, and the depth to the groundwater table. However, the field experiments conducted at various sites show that DNAPLs can reach a relatively deep water table within several weeks. The other consideration is that in the case of a large plume the vertical transport time is usually much shorter than the horizontal transport time. The error margins for any of the input parameters used in computing groundwater velocity are sufficiently large to compensate for an assumption of the instant transport from the ground surface to the water table.

The groundwater modeling was implemented using the Finite Element subsurface FLOW system (FEFLOW). The numerical model has been used for many years in the USA and other countries, and it is an accepted model within the groundwater community. The processes incorporated in the Omega Site transport model include advection and hydrodynamic dispersion. Sorption of contaminants onto sediment surfaces (retardation) and degradation of contaminants were not simulated. The effective porosity value assumed for the transport modeling is 0.3; the longitudinal and transverse dispersivity values used in the transport models were 100 meters and 0.5 meters, respectively. It is important to stress that the transport model was not calibrated. The objective of the modeling effort was to use the model as a tool for evaluating the remedial alternatives. Because the model is not calibrated, it should not be used to make long-term predictions; it is only a screening tool for remedial alternatives.

In conclusion, based on the reviewer's more than 30 years of groundwater hydrology experience, we believe that contamination from the former Omega facility could have migrated a distance of 4.5 miles and that the groundwater model is an appropriate tool for the evaluation of the remedial alternatives.

cc: Linda Fiedler, (5203P)
Mike Gill, Region 9
Kathy Baylor, Region 9
Glenn Bruck, Region 9
Richard Freitas, Region 9
Herb Levine, Region 9